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# CANADIAN ENERGY RESEARCH INSTITUTE

## CORPORATE PROFILE 1988

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CERI

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CERI

## MESSAGE FROM THE PRESIDENT

As another fiscal year draws to a close, I am pleased to report to you on the achievements of the Canadian Energy Research Institute. 1987/88 was filled with numerous events that bode well for the future of CERI. Numerous questions and issues at the forefront of Canada's energy debate reinforced the need for an independent appraisal of new developments and their implications. Never before has the Institute experienced so much interface with government, industry, and the general public as we worked together to provide insight on energy-related issues.

During the past year CERI staff were engaged in a broader range of studies and research projects relative to any previous year. No small task given the issues at hand. Deregulation of the natural gas industry, world oil markets, uncertainty and OPEC developments, the path of interprovincial and North American electricity generation development, and the future of coal-derived syncrudes in Canada were at the forefront of discussion. Affecting all sectors is the proposed Canada/U.S. Free Trade Agreement which has brought the development of continental energy markets to the top of Canada's energy policy agenda.

CERI released Study No. 26, "Towards a Continental Natural Gas Market", and commenced a related study of the electricity industry. The tremendous interest in these and other CERI studies has attracted a number of new sponsors.

The adoption of a business-oriented study format and continuation of CERI's important education-in-information and professional training function has also increased the value of the Institute to government and energy industry players.

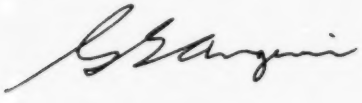
One indicator that CERI is successfully fulfilling its mandate is the increasing recognition of the Institute among a number of organizations. Staff of organizations such as the World Bank and the International Monetary Fund and numerous research organizations in North America and

elsewhere have been looking to the Institute frequently as a reliable, non-partisan source of energy information.

During the year, CERI staff members gave presentations and provided input to energy deliberations in Halifax, Washington, D.C., Stanford, and Sao Paulo, Brazil to name a few. CERI was also asked to provide general analytical support for **Energy Options: A Canadian Dialogue**, initiated by the Honourable Marcel Masse.

Acknowledgement by users of CERI reports is the ultimate measure of the Institute's success. In this regard a representative of a major energy industry organization wrote to say that the Institute's research on a particular topic had been "more detailed and more technically correct" than that which the company had undertaken in-house. This underlines the contribution which the Institute will continue to make in the days ahead.

Sincerely,



Dr. G.E. (Gerry) Angevine
President

## ABOUT THE INSTITUTE

The volatile and divisive energy issues and energy markets of the 1970s clearly demonstrated that industry and government needed an independent and non-partisan perspective on energy matters. On March 24, 1975, the Canadian Energy Research Institute (CERI) was formed to meet this need. In order to guide the Institute's endeavours, seven objectives were developed and incorporated into the constitution as follows:

1) A capacity for research and analysis which can be used by industry, various levels of government, and others, for investigations of problems related to energy industries;

2) Alternative approaches to the solution of these problems;

3) Increased opportunities in interdisciplinary studies and research for the University staff and students, and for employees of the industry and government;

4) Increased supply of persons with competence and experience in analyzing problems of resource development;

5) Increased opportunity to advance basic knowledge in areas of vital importance to Canada;

6) In due course, an independent source of reliable data; and

7) An instrument for liaison between the energy industries, government and universities.

Given the complexities and long-term nature of energy industry development, accurate and reliable information is crucial for proper decision-making and policy-setting. An independent economic research capability which is recognized and respected in all matters relating to energy is of benefit to government, the energy industry, and energy consumers. CERI brings together the knowledge, expertise, experience, needs and views of energy industry corporations, universities, and governments in order to focus on medium- to long-term energy issues and opportunities.

During more than 12 years of operation, the Institute has established a reputation for successful achievement of these objectives.

CERI's continued success and reputation is dependent on its research remaining objective and non-partisan in nature. This is ensured through a number of safeguards. The Institute's funding structure is designed to encourage support from a broad cross-section of private sector energy interests, in order to minimize the dependence upon any single source of funding from the business community. Public sector support from across Canada aids in a national assessment of energy issues. The ultimate assurance in support of the Institute's independent status is provided by the Board of Directors. The board members, named by the sponsoring organizations, develop the Institute's research program. This not only ensures an independent perspective to CERI publications but also allows industry and government to focus on economic research directed to Canada's most pressing energy issues. As always, the individual study authors are responsible for the content of CERI studies and reports.

The sponsoring parties of the Institute are: Energy, Mines and Resources Canada, the Alberta Department of Energy, the Private Energy Research Association (composed of corporate and individual members from oil, gas, coal, electrical, nuclear energy and pipeline companies), The University of Calgary, the Ontario Ministry of Energy and the Saskatchewan Department of Energy and Mines.

The Institute is housed in the Energy Resources Research Building which is located in the University Research Park, University of Calgary. Other major occupants of the building are the Petroleum Recovery Institute and the Computer Modelling Group. The building also contains the I. N. McKinnon Memorial Library's collection of energy-related books, journals and documents. Interaction among these various groups is extremely helpful for related Institute research projects.

Liaison between government and industry, provision of reliable and accurate energy sector information, publication of the results of analysis and policy recommendations to government, the energy industry, and energy

consumers, and the training of energy economists are the essence of the Canadian Energy Research Institute's services to its sponsors and to the public at large.

The Canadian Energy Research Institute is dedicated to the provision of quality research in energy economics. The Institute serves government, the energy industry and energy consumers through the production and publication of independent research. CERI publications provide government policy-makers and company executives with thoughtful analysis on pressing issues in Canadian energy matters. CERI publications are placed in the public domain at nominal cost to ensure access by all interested parties.

## CERI ADMINISTRATION AND STAFF

The Institute is managed by a Board of Directors and a President, Dr. G.E. Angevine. The President is assisted by Mr. A.E. Reinsch, Vice President. They are supported by a staff of nine economists and analysts, a conference coordinator and a small secretariat.

The Board of Directors is a very important part of the Institute as the directors embody a unique range of experience and expertise. The board sets overall fiscal and operating policy and approves and initiates research projects and budgets. Institute sponsors appoint representatives to serve as directors. Meetings are held quarterly. At the close of the 1987-88 fiscal year, members of the board and alternates were as follows:

The University of Calgary:

- Dr. F.A. Campbell, then Vice President, Priorities and Planning, with the University of Calgary, Vice-Chairman.
- Dr. M.B. Brinkerhoff, Associate Vice President (Research), with the University of Calgary.
- Mr. M.M. Williams, Chairman, TransAlta Utilities Corporation, Calgary.

Government of Alberta:

- Mr. W.D. Dickie, formerly Alberta Minister of Mines and Minerals, Calgary.
- Mr. N.E. MacMurchy, Assistant Deputy Minister, Alberta Department of Energy, Edmonton.
- Dr. S.B. Cassin, Alberta M.L.A. for Calgary Northwest.

Government of Canada:

- Mr. R.W. Erdmann, Director General, Financial and Market Analysis Branch, Energy, Mines and Resources Canada.
- Mr. Ron Edwards, Director, Energy and Resource Policy Division, Department of Finance, Ottawa.
- Vacancy created by the withdrawal of Mr. C.B. Marriott in the fall of 1987. Mr. Marriott is the Director-General of the Electricity Branch of Energy, Mines and Resources Canada in Ottawa.

Government of Ontario:

- Mr. Bruce MacOdrum, Assistant Deputy Minister, Ontario Ministry of Energy, Toronto.

- Mr. Duncan Taylor, Acting Manager, Economics and Forecasts, Ontario Ministry of Energy, served as the alternate representative for the Ministry during the latter part of the year.

Government of Saskatchewan:

- Ms. Pat Youzwa, Assistant Deputy Minister, Resource Policy and Economics, Saskatchewan Department of Energy and Mines, Regina. J. Forster is the alternate representative for the Department.

Private Energy Research Association:

- Mr. A.H. Ross, President, Allaro Resources Limited, Calgary, Chairman.

- Mr. D.G. Stoneman, Senior Vice President, Business Development, Shell Canada Limited, Calgary.

- Dr. G. Capobianco, Vice President, Coal, Esso Resources Ltd., Calgary.

The majority of research work undertaken by CERI is carried out by Institute staff, with particular components (and on occasion, entire studies) contracted out to industry and academic experts as required. Since its inception in 1975, the Institute has awarded more than one million dollars in contract research to Canadian consultants.

The Institute is fortunate to have a dedicated staff of highly qualified professionals. Institute officers and senior research staff bring a combined total of 64 years of industry and research experience to the analysis of energy issues. Together with an able staff of economists, their interest and enthusiasm is reflected in the quality and vigour of CERI's research program.

The breadth of energy analysis and coverage offered by the Institute is reflected in the quantity of research staff and their areas of experience.

## SPECIAL EXPERTISE AND EXPERIENCE OF RESEARCH STAFF AND ASSOCIATES
**as of September 1, 1988**

| | |
|---|---|
| Dr. G. Angevine: | macro economics and stabilization policy; macro economic forecasting; world oil, natural gas and electricity market analysis and forecasting. |
| Mr. K. Brown: | continental natural gas markets; world oil market. |
| Ms. M. Heath: | petroleum economics; natural gas; alternative transportation fuels; enhanced oil recovery; heavy oil economics. |
| Ms. M. Heggelund: | industrial natural gas demand; natural gas market analysis. |
| Mr. M. MacRae: | oil sands economics; electricity economics; energy security issues; coal economics; alternative fuels. |
| Mr. A. Reinsch: | electricity economics; world oil market; forecasting and analysis related to natural gas and petroleum markets; energy options; full-cycle oil and gas production costs. |
| Ms. N. Sanford: | conference program and publication coordination. |
| Mr. G. Sawka: | energy economic analysis. |
| Mr. J. Stanford:* | world oil market; energy demand. |
| Mr. J. Tanner:** | oil supply economics and modelling; petroleum industry activity forecasting; finding costs. |
| Mr. R. Wise: | world oil market analysis; energy economic analysis. |

* On loan to Energy, Mines and Resources Canada in Ottawa
** Research Associate

## CERI FUNDING
### April 1987 to March 1988

Sponsors' contributions:

| | |
|---|---|
| Alberta Department of Energy | $125,000 |
| Energy, Mines and Resources Canada | $125,000 |
| Private Energy Research Association (A consortium of energy industry companies organized as an association to provide private sector support for the Institute) | $125,000 |
| Ontario Ministry of Energy | $ 75,000 |
| Saskatchewan Department of Energy and Mines | $ 25,000 |
| | $475,000 |

The University of Calgary serves as trustee and accountant for CERI and provides access to computer, library and other facilities.

Some additional revenue is provided by conferences, seminars, and publication sales.

For the five-year period commencing April 1, 1988 the Private Energy Research Association has agreed to provide at least $200,000 to CERI annually. The founding government sponsors, Alberta and Canada, have each been asked to match the annual contribution by the Industry group.

## REPORT ON OPERATIONS

The objective of the Institute research program and conference/seminar activities is to provide a more informed understanding of the energy market and of energy issues important to Canada. CERI has developed a network of professionals who advise on particular research projects, of organizations and institutes willing to collaborate in research efforts, and of noted authorities in Canada and around the world. This network greatly enriches the Institute's ability to undertake state-of-the art, objective research.

Over the past three years, the Institute has shifted focus from technical economic analysis to analysis of energy policy issues. CERI has seldom made detailed policy recommendations, but the policy implications of economic analysis have been identified and discussed. Policy questions will be addressed in greater depth in the future. This is possible now that the Institute has a number of experienced staff members familiar with the constraints and sensitivities which confront policy makers.

These special attributes, in combination with CERI's core activities and services--research, conferences, staff presentations, and special events--place the Institute in a unique position to assist government, industry and consumers.

## RESEARCH
### Advisory Committees

To a large degree the success of CERI's research program reflects the many hours of assistance provided by industry and government officials who served on project Advisory Committees. Their service is greatly appreciated. The interest and contribution of these numerous volunteer advisors is critical to the Canadian Energy Research Institute's commitment to maintain a high standard of excellence in its research.

The following persons served on project Advisory Committees during the period April 1, 1987 through March 31, 1988.

| | Affiliation |
|---|---|
| Mr. Paul Bakker | Ontario Ministry of Energy<br>Toronto, Ontario |
| Mr. Dave Bandy | Esso Resources Canada Ltd.<br>Calgary, Alberta |
| Mr. Ken Beswick | Alberta Grain Commission<br>Edmonton, Alberta |
| Mr. Peter Brakel | Energy, Mines and Resources Canada<br>Ottawa, Ontario |
| Mr. Jeff Christie | Energy, Mines and Resources Canada<br>Ottawa, Ontario |
| Mr. John Chuckman | Texaco Canada Inc.<br>Toronto, Ontario |
| Mr. Len Coad | British Colombia Department of Energy,<br>Mines and Petroleum Resources<br>Victoria, British Columbia |
| Mr. Rob Conn | Energy, Mines and Resources Canada<br>Ottawa, Ontario |
| Mr. Terry Crowe | TransAlta Utilities Ltd.<br>Calgary, Alberta |
| Ms. Judith Dwarkin | Alberta Department of Energy<br>Edmonton, Alberta |

| | |
|---|---|
| Mr. Larry Fisher | Esso Resources Canada Ltd.<br>Calgary, Alberta |
| Ms. Jane Forster | Saskatchewan Department of Energy and Mines<br>Regina, Saskatchewan |
| Mr. J.R. Frey | Alberta Power Ltd.<br>Edmonton, Alberta |
| Mr. Roland George | Gaz Metropolitain Inc.<br>Montreal, Quebec |
| Mr. Bob Greven | Ontario Ministry of Energy<br>Toronto, Ontario |
| Prof. Wolf Hafale | Kernforschungsanlage (K.F.A.)<br>Julich, West Germany |
| Mr. Robert Hoffman | Statistics Canada<br>Ottawa, Ontario |
| Mr. James Hughes | Imperial Oil Ltd.<br>Toronto, Ontario |
| Mr. Ric Hyndman | Alberta Department of Energy<br>Edmonton, Alberta |
| Mr. Mark Jaccard | Simon Fraser University<br>Burnaby, British Columbia |
| Mr. Blaine Kennedy | Energy, Mines and Resources Canada<br>Ottawa, Ontario |
| Mr. Marcel Kramer | International Energy Agency<br>Paris, France |
| Mr. Bernie Le Boeuf | Union Gas Ltd.<br>Chatham, Ontario |
| Dr. Bill Langford | Nova, An Alberta Corporation<br>Calgary, Alberta |
| Mr. P.J. Lee | Institute of Sedimentary and Petroleum Geology<br>Calgary, Alberta |
| Mr. Tom Lester | Independent Petroleum Association of Canada (IPAC)<br>Calgary, Alberta |

| | |
|---|---|
| Mr. Lino Luison | Consumers' Gas<br>Willowdale, Ontario |
| Mr. Doug McDonald | Alberta Department of Energy<br>Edmonton, Alberta |
| Mr. James McNabb | Conoco Ltd.<br>Wilmington, Delaware |
| Mr. Bob Modray | Gulf Canada Resources Ltd.<br>Calgary, Alberta |
| Mr. A. Norlander | City of Calgary Electric System<br>Calgary, Alberta |
| Mr. Don O'Connor | Mohawk Oil Co. Ltd.<br>Burnaby, British Columbia |
| Mr. Gerry Protti | Alberta Department of Energy<br>Edmonton, Alberta |
| Mr. David Pumphrey | U.S. Department of Energy<br>Washington, D.C. |
| Mr. David Reeve | CANMET, Energy Mines and Resources Canada<br>Ottawa, Ontario |
| Mr. Roy Sage | Energy, Mines and Resources Canada<br>Ottawa, Ontario |
| Mr. Krishna Sahay | Department of Finance Canada<br>Ottawa, Ontario |
| Mr. Ram Sahi | Energy, Mines and Resources Canada<br>Ottawa, Ontario |
| Mr. Myron Sereda | Saskatchewan Department of Energy and Mines<br>Regina, Saskatchewan |
| Mr. Gordon Sparks | University of Saskatchewan<br>Saskatoon, Saskatchewan |
| Mr. Bob Stewart | Atlantic Provinces Economic Council<br>Halifax, Nova Scotia |
| Mr. Lakis Vouyoukas | British Petroleum PLC<br>London, England |

| | |
|---|---|
| Mr. Dwaine Weckman | Esso Resources Canada Ltd.<br>Calgary, Alberta |
| Mr. David Wood | Massachusetts Institute of Technology<br>Cambridge, Massachusetts |
| Mr. J. Woods | Gas Research Institute<br>Washington, D.C. |

Program

The 1987/88 research program was the most active in the history of the Institute. CERI had a number of major research projects underway which focused on key energy industry sectors: crude oil, natural gas, coal, electricity, world energy markets, and policy analysis.

Research projects at CERI begin with directors and staff surveying government and industry members for topic ideas/concepts. The remaining stages include; validation of the research topic by the Board of Directors, management of actual research by senior staff, review by Advisory Committee members, and publication of the research findings. At the close of the fiscal year, CERI had completed three major research projects and had 10 projects in various stages of completion. Published reports included an evaluation of Saskatchewan's conventional crude oil supply, a report on the developments in continental natural gas trade, and a comprehensive analysis of a peak load forecasting model for Alberta's interconnected electric power system (Part A of this section contains a description of these publications). A report on the economic prospects for coal-derived syncrudes and an update to previous CERI reports on Alberta oil and gas finding costs were at the printer.

Three new regular services are being developed which will complement the regular World Oil Market Analysis publication.

a) World Oil Market Report (WOMR) (annual).
b) Canadian Energy Market Analysis (CEMA) (semi-annual).
c) Full-Cycle Oil and Gas Costs in Western Canada (annual).

The continued involvement of industry and government is critical to the future development of these services. Incorporation of data and viewpoints from national and international authorities in industry and government assists in providing timely, accurate, and practical information to our constituents.

The WOMR service will provide an annual examination of alternative medium- to long-term development prospects for the world oil market, as well as detailed regional analysis. It will complement CERI's highly successful **World Oil Market Analysis** report and lead to recognition of the Institute as one of the leading authorities on world oil market developments.

CEMA will be targetted to corporate executives and senior government officials. The report will provide an assessment of recent events and quarterly price and volume forecasts over a 36-month period for oil, natural gas, electricity and refined petroleum product markets in Central and Western Canada. It is planned to broaden the scope of the CEMA report at an early date to include coal. Full-Cycle Oil and Gas Costs will provide an annual update to participants in, and observers of, the oil and gas industry.

Projects in progress at the end of the year included: an assessment of the economics of ethanol and methanol as alternative transportation fuels in Canada; a disaggregated forecast of industrial gas demand by region; domestic crude oil supply-demand balances; a study of the future of the Canadian electric power industry; and development of a computerized system for evaluation of Alberta's crude oil supply under different price, cost and royalty assumptions (see Research Reports Underway for a description of these projects).

New Studies and Research Reports

i) **An Evaluation of Crude Oil Supply in Saskatchewan. CERI Study No. 25 (Price: $30.00, 156 pages).**

**Author:** **James Tanner**
**Released:** **December 1987**

This study was conducted in concert with the Saskatchewan Department of Energy and Mines, Energy, Mines and Resources Canada, and the Geological Survey of Canada. It was carried out in two major sections: an analysis of Saskatchewan's current productive capacity; and development of a forecasting methodology for oil reserves additions. Data was received from all parties involved and the analytical framework was developed with their cooperation and assistance.

The resulting computerized evaluation system for conventional crude oil in Saskatchewan provides an oil production profile for Saskatchewan under different economic assumptions and an estimate of ultimate Saskatchewan reserves which is sensitive to changes in economic and fiscal parameters.

ii) **Towards a Continental Natural Gas Market: Historical Perspectives and Long-Term Outlook. CERI Study No. 26 (Price: $45.00, 457 pages).**

**Author:** **Kevin Brown**
**Executive Summary Released:** **February 1988**
**Main Report Released:** **April 1988**

This study is a detailed analysis of the development, current state and long-term outlook for the Canada-U.S. natural gas market. The outlook section of the report, developed in collaboration with the Gas Research Institute (Chicago, Ill.) and Decision Focus Inc. (Los Altos, Calif.), examines demand trends, supply costs and volumes, transportation costs and gas trade flows for every current and potential gas producing area in North America. The study focuses on long-term gas flow developments, and provides likely projections for domestic gas market development; gas export volumes, prices and flows; and

allocation of gas supplies within the U.S. market. Developed within the framework of an unrestricted, continental gas market, the study is the first comprehensive analysis available of the likely impact of Canada-U.S. free trade on the Canadian natural gas sector.

iii) **A Peak Load Forecasting Model Case Study: The Alberta Interconnected System. CERI Research Report 87-2 (Price: $20.00, 81 pages).**

**Author:** **Morgan MacRae**
**Released:** **July 1987**

This study examines the impact of changes in electricity price by sector (e.g., residential, commercial and industrial), on energy consumption and on the demand for power. A peak load forecast is derived which is consistent with a long-term forecast of customer class energy sales. An assessment of the effects of potential load management programs and parallel electric power generation by utility customers in specific sectors is also provided. The study provides a comparatively simple framework for examining peak load characteristics which will be of interest to electric utilities and to any industry dealing with planning for peak-period demand.

iv) **The World Oil Market Analysis (WOMA). A quarterly CERI publication on events and issues in the world oil market with regular, monthly updates. Available to non-sponsors for $345.00 per year.**

Recent issues of the WOMA quarterly have contained articles on energy development in the People's Republic of China; a forum on free trade and the energy sector; the resilience of non-OPEC crude oil supply in the face of weak oil prices; the trend towards vertical reintegration of the world oil market; and an exclusive interview with OPEC President and Nigerian Minister of Petroleum Resources, Alhaji Rilwanu Lukman, conducted during his recent visit to the Institute. Future articles will include an analysis of the changing pattern of world crude oil inventories, the annual long-term world oil market outlook, and a special WOMA Forum on the prospects for the oil market into the 1990s.

## Research Projects Underway

At the end of March 1988, the Institute research program comprised ten projects at various stages of completion. Two projects are virtually completed, six are well underway and two are at the proposal stage. As can be seen by the project descriptions below, a broad range of energy topics will be covered.

### i) An Assessment of the Potential for Coal-Derived Syncrudes in Canada.

**Author:** Morgan MacRae
**Released:** June 1988

This study was published as CERI Study No. 27 in June and a seminar on the results was held at the Bow Valley Square auditorium in Calgary on June 28. The report provides a detailed technical and economic assessment of coal liquids technology (coal/oil co-processing and single- and two-stage direct liquefaction) within a Canadian context. A comparative analysis is also provided of the alternative sources of Canadian nonconventional crude oil liquids; frontier development, integrated mined oil sands plant, high conversion bitumen upgrader, low conversion heavy oil/bitumen upgrader, two-stage direct coal liquefaction, and coal/oil co-processing. The analysis was undertaken in conjunction with the Alberta Research Council using their AERAM family of energy assessment models.

The study results support the deployment of commercial coal/oil co-processing technology, even under the conservative costing and pricing assumptions used in the analysis. A strong research effort is recommended to ensure that Canada remains positioned at the forefront of this technology and able to commercially develop this source of light crude oil.

**ii) Oil and Gas Finding Costs in Alberta: 1970-1986**

**Author:** **Janice Pasay**
**Released:** **June 1988**

This is the last in the CERI series on oil and gas finding costs. The study, released as Research Report 88-1, is a straightforward update of RR87-1 which contained a detailed discussion of the methodology employed for finding cost analysis and an extensive sensitivity analysis of historical oil and gas finding costs in the Province. The current study will be followed by annual reviews of finding and development costs for oil and gas in Alberta and Saskatchewan. A comparable analysis for British Columbia may also be initiated.

**iii) Stability Within Uncertainty: Evolution of the World Oil Market**

**Authors:** **Anthony Reinsch, Kevin Brown and James Stanford**
**Release:** **September/October 1988**

The flexibility and level of disaggregation built into the analytical framework of this important CERI research project has allowed the Institute to investigate such questions as: What is the "free-market" price for crude oil? In what regions of the world would crude oil production be shut-in under a free market scenario, and at what price? Where are the most promising areas for exploration and development activity? Where will future demand growth be centered? What are the prerequisites for, and implications of, various world market structures and strategies (e.g., OPEC price control, OPEC quantity control, GOPEC, expanded OPEC, etc.)? As an annual service to sponsors, this study will be updated and extended to provide an annual examination of alternative medium- to long-term development prospects for the world oil market, as well as detailed regional analysis. Insight from the data supporting the study will make this a most useful and sought after Institute service.

**iv) Canadian Crude Oil Supply-Demand Balances.**

**Authors:** James Tanner and W.H. (Ted) Ingram
**Release:** October 1988

This study will provide a timely, detailed assessment of current and potential Canadian supplies of crude oil by type, and domestic crude oil demand by product slate. The supply side assessment, undertaken in conjunction with the Alberta Research Council, covers all conventional, nonconventional and frontier sources of crude oil. The demand side analysis, developed using the CERI CREED Model (Canadian Regional End-Use Energy Demand Model), encompasses an assessment of and outlook for refined petroleum product demand, by region and by product type. The interface of these two analyses will yield observations regarding the surplus/deficit situation for crude oil and products, implications for exports and imports of each, and recommendations regarding the current configuration of Canadian refinery capacity, adequacy of existing transportation infrastructure, and the development of supply sources in Canada.

**v) The Commercial Experiment: Ethanol and Methanol as Alternative Transportation Fuels**

**Author:** Michelle Heath
**Release:** October 1988

This study will provide a detailed technical and economic assessment of the value of "alternative" transportation fuels in Canada. The analysis is focussed on ethanol, methanol and methanol/ethanol blends and their potential as gasoline extenders and/or octane enhancers in the Canadian transportation sector. Information and experience is drawn from international programs on alternative transportation fuels, and the results of research into the technical feasibility of these fuels (e.g., corrosion properties, octane and blending properties, etc.) is provided. In the case of ethanol, an extensive analysis of potential plant sites in Canada has been undertaken, and the economic and commercial feasibility of such plants are explored in some detail.

Finally, a number of conclusions are drawn as to the major obstacles to the successful application of these technologies in the Canadian energy sector.

**vi) Industrial Gas Demand in Canada**

**Author: Merete Heggelund**
**Release: December 1988**

Unlike many analyses designed to investigate aggregate industrial gas demand as a share of total gas and/or energy consumption, this study assesses the future trend of gas demand in selected energy-intensive industries in Canada. The study is focussed on the likely rate and form of technology penetration in the end-use markets and, based on product demand outlooks and relative price movements, the resulting path of industrial gas demand in Canada. The analytical component of the study is based on detailed industrial process models applied to an interactive input-output framework describing Canada's industrial sector. The results will be provided on a national level and by selected industry, forming a comprehensive assessment of this important Canadian energy market.

**vii) Oil and Gas Finding and Development Costs in Western Canada. (Annual Updates available each Spring).**

**Authors: Anthony Reinsch and Garry Sawka**
**Release: February/March 1989**

This study represents a major extension of the Institute's earlier work on oil and gas finding costs. The research will provide a methodology for calculating crude oil finding, development, and production costs in Saskatchewan and Alberta. The research will be based on Canadian Petroleum Association data, for interprovincial comparisons, and on provincial data provided by the respective provincial energy departments and by the Alberta Energy Resources Conservation Board.

The study will provide a consistent set of full-cycle cost estimates which can be used as the basis for government-industry negotiations

and discussions. It is intended that the study will be updated each year so as to provide a regular analysis of trends in hydrocarbon costs in Western Canada.

### viii) An Evaluation of Crude Oil Supply in Alberta

**Author:** **James Tanner**
**Release:** **May 1989**

This project is an application to Alberta of the basic methodology developed for a similar CERI study of Saskatchewan crude oil production (Study No. 25). Enhancements to the research methodology will be undertaken to account for the greater role of natural gas in Alberta's hydrocarbon resource base and the geological, geophysical, exploration and development features particular to the province of Alberta.

The study will provide both short- and long-term analyses of supply response to changes in crude oil price, economic indicators, royalties, incentive programs, and other fiscal levers available to provincial energy policy-makers. The framework will provide both government and industry with a detailed, comprehensive assessment of Alberta's current and potential reserves base, undertaken in collaboration with the Institute for Sedimentary and Petroleum Geology, and a tool for investigating the likely impact of fiscal and policy changes on the supply of crude oil in Alberta.

Incremental funding and research support required to augment the Institute's budget allocation to the study have been largely secured. The Institute of Sedimentary and Petroleum Geology, the Alberta Energy Resources Conservation Board, the Independent Petroleum Association of Canada, the National Energy Board, the Canadian Petroleum Association, Energy, Mines and Resources Canada and the Alberta Department of Energy have all agreed to contribute to the undertaking.

**ix) Plotting a Course for the 1990's: The Future of Electric Power in Canada.**

**Author: Morgan MacRae**
**Release: July 1989**

With the deregulation of crude oil and natural gas markets in Canada largely completed, the electricity sector stands out as the last bastion of federal and provincial government regulatory control. This study is intended to analyze the merits and demerits of this regulatory control, and to examine the likely development of domestic electricity generation and trade within a less regulated environment.

This study will be undertaken in collaboration with the Policy Studies Group of Energy, Mines and Resources Canada, and with substantial input from the Electric Power Research Institute (EPRI), the U.S. Department of Energy, and electric utilities across Canada. The final report will provide an educational and insightful look at the electricity industry in Canada and recommendations regarding the future development of that industry.

**x) Canadian Energy Market Analysis. A semi-annual publication released in January and July.**

The Canadian Energy Market Analysis (CEMA) will be initiated in January 1989 with the release of the first of a series of semi-annual assessments of the energy market in Canada. Early versions of CEMA will discuss recent developments in the oil, natural gas, electricity and refined petroleum products (RPP) markets in Central and Western Canada, and provide a 36-month price projection for each of the energy sources on a regional basis. Coal market developments will be discussed in later editions of the report.

CEMA is intended to provide a comprehensive analysis of current and expected developments in Canadian energy commodity markets. It will be particularly useful to business executives and senior government officials who do not have the time to follow the energy market in

detail but who require an objective, independent assessment of market developments either as direct input to decision-making or as a check against internal projections.

## CONFERENCES

The Sixth Annual International Oil and Gas Markets conference, co-sponsored by CERI and the Calgary Chamber of Commerce, was held during September 1987 in Calgary. The Institute is pleased with the growing recognition this annual event receives. Foreign attendees have increased over recent years with the largest overseas contingent attending in 1987. Most noteworthy were addresses made by Sir Albert Thomas Lamb, KBE, CMG, DFC, Director of British Shipbuilders and of Britoil PLC, Former U.K. Ambassador to Kuwait and Norway, Former Assistant Under Secretary in the Foreign Office, and Hani Abdul Aziz Hussain, Executive Managing Director, Marketing, Kuwait Petroleum Corporation. Increased recognition of the CERI conference by foreign governments and corporations will increase as the Institute continues to attract authorities from abroad.

Plans for the Seventh Annual CERI International Oil and Gas Markets Conference are well underway. The event will be held at the Calgary Convention Centre, September 18-20. The 1988 conference will feature over twenty distinguished speakers from Europe, the Middle East, South America, the United States and Canada. CERI wishes to acknowledge the tremendous assistance received from the Calgary Chamber of Commerce in staging this event.

CERI was actively involved in the Energy Options dialogue initiated by the Hon. Marcel Masse. The Institute organized a conference in Calgary to kick-off the process in June of 1987. CERI also organized the program for the Energy Options seminar on Energy: The International Dimension, held in Halifax in November 1987. Following the December wind-up conference in Montreal, several Institute staff were on call to assist the Energy Options Secretariat in preparing the report of the Kieran's Advisory Committee to the Minister.

## SEMINARS/STAFF PRESENTATIONS

Speaking engagements afford excellent forums for Institute staff to contribute to public policy debates, to place information in the public domain, and to facilitate interaction between government and industry. Several important seminars were held in the year ended March 31, 1988 and a number of presentations were made by CERI staff.

Kevin Brown, senior economist, communicated the results of his study, Towards a Continental Natural Gas Market: Historical Perspectives and Long-Term Outlook, at four separate seminars. On March 25, 1988, Mr. Brown spoke to staff of Energy, Mines and Resources Canada and the National Energy Board about the modelling framework used in his natural gas study and its potential application and use by these groups. Public seminars on the study results were held in Calgary and Toronto in April and May of 1988.

James Tanner, research associate, held several seminars on his study, An Evaluation of Crude Oil Supply in Saskatchewan. The results of his study were presented at a public seminar in Calgary, to staff of the Alberta Department of Energy in Edmonton, and to local industry representatives and staff of the Saskatchewan Department of Energy and Mines in Regina.

Anthony Reinsch, Manager, Institute Research, presented a paper to the Trinational Energy Policy Workshop held at Stanford University on March 21-22, 1988. The workshop consisted of 30-40 participants from the senior ranks of the energy industry, government and academia in Canada, the United States and Mexico. Discussions were focused on energy trade policy and the proposed Canada-U.S. Free Trade Agreement. In August 1987, Mr. Reinsch represented Canada at a meeting of the southern hemisphere branch of the Institute of Electrical and Electronic Engineering in Sao Paulo, Brazil where he spoke about Canadian energy and energy policy developments.

## SPECIAL EVENTS

His Excellency Alhaji Rilwanu Lukman, Nigerian Minister of Petroleum Resources and President of OPEC, made his first official visit to Canada February 7-10, 1988 as the guest of the Canadian Energy Research Institute. While in Western Canada the Minister met with the Premiers of Saskatchewan and Alberta and with members of the Provincial Cabinets. He also held private discussions with senior oil executives and addressed oil industry leaders at an invitational dinner sponsored by CERI at the Ranchmen's Club on February 8. The Minister toured Nova Corporation's ethylene and polyethylene production facilities at Joffre. During his visit the Minister was accompanied by Dr. Gerry Angevine, CERI's Executive Director.

Dr. Kenneth Lay, Chairman and Chief Executive Officer of Enron Corporation in Houston spoke at a special dinner for PERA members on January 21 at the Calgary Petroleum Club.

Through these and other activities, the Institute is working to improve public understanding of critical issues and to improve the quality of energy policy.

## FUTURE OBJECTIVES AND PLANS

**Mission:** **To assist sponsors in solving problems and assessing market opportunities by carrying out research on all matters relating to energy. To encourage and make possible the sharing of knowledge, expertise, and perspectives among its members in these areas. To disseminate at home and abroad the information and insights gained through public domain placement and communication of Institute activities.**

In the 1987/88 fiscal year, CERI took major steps towards achieving its mission. The Institute's critical mass of expertise, the number of services offered, and the degree of interface with sponsors were all strengthened. Increasing in-house professional expertise will allow more problems to be researched and more questions answered. The provision of additional regular services will allow sponsors to regard CERI as a regular source of pertinent information, and will increase contact with industry and government.

The Institute will continue to concentrate on four main objectives:

1) To ensure that research is carried out independently and that it is timely, accurate, practical and reliable.

2) To understand the information needs of Institute sponsors and to communicate the required information in a practical and useful manner.

3) To create opportunities for interface between government, the energy industry, and energy consumers on a national and international basis.

4) To provide information which addresses a broader range of interests and services the needs of a greater number of people.

CERI's ability to achieve these objectives lies in its ability to incorporate the needs and interests of all interested parties. The large number and diverse backgrounds of Advisory Committee members provides an example of this.

The Institute is constantly striving to better understand the needs of its sponsors (and the constraints under which they operate) in order to provide them with the information and services they hold most valuable and useful. Numerous programs have been put in place to ensure that CERI's research results are communicated effectively.

The trend towards international markets has created the need to incorporate the knowledge, expertise, and perspectives of international authorities in addition to domestic authorities. A campaign is in process to encourage involvement by international organizations, individuals, and governments as associate sponsors of the Institute.

A second trend is the ever-increasing amount of information that is available. Managers require information presented in a clear and concise manner. Activities ranging from the provision of brief executive summaries in all research reports to the utilization of desktop publishing technology are being implemented in order to accommodate this need.

Industry and marketplace changes are occurring at an increasing pace. This trend has been met with measures which will ensure that CERI's information is timely. Examples are the provision of public seminars for authors to present their newly released research and a 50% reduction in publication time.

Another important trend is the increasing complexity of operating environments. With the increasing speed of market transitions, government and industry have greater difficulty in undertaking comprehensive, in-depth research. Increasingly, more organizations are relying on the kind of services and information which CERI provides. This is exemplified by a 16% increase in membership of the Private Energy Research Association over the 1987/88 fiscal year and by the number of inquiries regarding the availability of research information. CERI's management is successfully addressing these issues and encourages increased contact from sponsors in order to facilitate the Institute's ability to provide essential information and analysis.

Increased awareness of CERI itself and the services offered at home and abroad is continually on the rise. New sponsors from Central and Atlantic Canada, users of and subscribers to CERI reports from OPEC nations, government agencies in the U.S., and firms and universities in Europe provide but a few examples of the important service which the Institute is providing. The officers and directors of the Canadian Energy Research Institute are taking steps to ensure continued progress and product/service improvement.

## 1987/1988 MILESTONES

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| - Fiscal Year 1987/88 | : | The Private Energy Research Association (PERA) welcomes 11 new members. |
| - April 1, 1988 | : | A new five-year sponsorship agreement among sponsors of the Canadian Energy Research Institute commences. |
| - March 1988 | : | Released: Towards a Continental Natural Gas Market: Historical Perspectives and Long-Term Outlook. CERI Study No. 26 by Kevin J. Brown. |
| - March 1988 | : | CERI NEWS is released to all sponsors. |
| - March 25, 1988 | : | Kevin Brown meets with staff of Energy, Mines and Resources Canada and the National Energy Board regarding the analytical framework used in his natural gas study and its potential application and use by these groups, Ottawa. |
| - March 21-22, 1988 | : | Anthony Reinsch presents a paper to the Trinational Energy Policy Workshop held at Stanford University. Mr. Reinsch's comments were directed to the future of Canada-U.S. trade in crude oil and natural gas. |
| - February 1988 | : | James Tanner presents the results of "An Evaluation of Crude Oil Supply in Saskatchewan" to staff of the Alberta Department of Energy, Edmonton. |
| - February 7-10, 1988 | : | His Excellency Alhaji Rilwanu Lukman, Nigerian Minister of Petroleum Resources and President of OPEC, makes his first official visit to Canada, at the invitation of the Canadian Energy Research Institute. On February 8th he addresses oil industry leaders at an invitational dinner sponsored by CERI at the Ranchmen's Club, Calgary. |
| - January 1988 | : | James Tanner presents the results of "An Evaluation of Crude Oil Supply in Saskatchewan" to local industry representatives and staff of the Saskatchewan Department of Energy and Mines, Regina. A public seminar was also held in Calgary during February. |

- January 21, 1988 : Dr. Kenneth Lay, Chairman and Chief Executive Officer of Enron Corporation in Houston addresses a special dinner for PERA members and invited guests at the Calgary Petroleum Club, Calgary.

- December 1987 : Released: An Evaluation of Crude Oil Supply in Saskatchewan, CERI Study No. 25, by James Tanner.

- November 1987 : "Energy: The International Perspective", a special topic seminar, is held in Halifax as a part of Energy Options: A Canadian Dialogue. CERI organized the seminar program and Anthony Reinsch chaired the proceedings. Morgan MacRae presented the findings of analysis related to Canadian security of energy supply, co-authored by Merete Heggelund.

- November 1987 : Kevin Brown addresses delegates at the International Association of Energy Economists Annual North American meeting in Washington, D.C. Mr. Brown speaks about Canadian natural gas supply and its interrelation with the North American natural gas market.

- Sept. 27-29, 1987 : The Sixth Annual CERI International Oil and Gas Markets Conference, Calgary.

- August 1987 : Anthony Reinsch addresses the first World Energy Congress of the Institute for Electrical and Electronic Engineering, held in Sao Paulo, Brazil. Provides an hour-long presentation on Canada's energy economy.

- July 1987 : Released: A Peak Load Forecasting Model Case Study: The Alberta Interconnected System. CERI Research Report 87-2, by K. Morgan MacRae.

- June 1987 : Energy Options: A Canadian Dialogue, launched by the Hon. Marcel Masse, formally begins with an opening conference sponsored by CERI, Calgary.